Yaquina Bay Bridge
Spanning Yaquina Bay on the Oregon Coast Highway
Newport
Lincoln County
Oregon

HAER OR-44

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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HISTORIC AMERICAN ENGINEERING RECORD

YAQUINA BAY BRIDGE
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Location:	Spanning the mouth of Yaquina Bay on the Oregon Coast Highway, Newport, Lincoln County, Oregon UTM: Yaquina, Oregon Quad. 10/141540/1494122
Date of Construction:	1934-1936
Structural Type:	Multi-span steel and reinforced concrete deck arch
Engineer:	Conde B. McCullough, Oregon State Highway Department
Builder:	Gilpin Construction Company General Construction Company
Owner:	Oregon Department of Transportation
Use:	Vehicular and pedestrian bridge
Significance:	Yaquina Bay Bridge is an excellent example of the work of Conde B. McCullough, Oregon State Bridge Engineer from 1919 to 1946. It is one of five multi-span arch bridges designed by McCullough for the Oregon Coast Highway.
Project Information:	Documentation of the Yaquina Bay Bridge is part of the Oregon Historic Bridge Recording Project, conducted during the summer of 1990 under the co-sponsorship of HABS/HAER and the Oregon Department of Transportation. Researched and written by Kenneth J. Guzowski, HAER Historian, 1990. Edited and transmitted by Lola Bennett, HAER Historian, 1992.
Related Documentation:	For more information on Conde B. McCullough, see HAER OR-54.

HISTORY

The City of Yaquina was incorporated in 1867, when the railroad, first called the Willamette Valley and Coast Railroad Company and later the Oregon-Pacific Railroad, was completed to connect Corvallis with Yaquina Bay. Yaquina was the name of the native Americans who inhabited the area prior to pioneer settlement.

Newport received its name on July 4, 1866 and is one of the oldest settlements on the Oregon Coast. The economy of the area was based on commercial fishing and the lumber industry. Steamship connections between San Francisco and Yaquina began in 1885. The combination of sheltered harbor and broad ocean beaches is unique for recreation, making this the focal point of this beautiful vacation area. There are approximately three miles of bay and ocean frontage within the city's boundaries. Before the development of U.S. Highway 101 in the late 1920s, Newport was the tourist center for the mid-Willamette Valley. Tourists came to Yaquina Bay by train from Corvallis and other Willamette valley towns.

The Oregon Coast Highway was constructed in a piecemeal fashion beginning in Clatsop County in 1914. Sections of the highway were constructed north and south from the cross-mountain roads. Limited funds prohibited rapid development of the coast highway, however, in 1919 the Oregon legislature passed a bond issue of $2.5 million to complete the Roosevelt Coast Military Highway. After World I, the United States military establishment was concerned about defending inaccessible coastline, and supported this bond measure. The era of long-distance automobile touring exploded in the 1920s adding impetus to the completion of the coast highway for tourism reasons. The road, and various small bridges, were constructed over a twenty year period by the different counties, ultimately uniting the disparate highway sections. In 1931, Lewis A. McArthur suggested that the name of the Roosevelt Coast Military Highway be changed to the Oregon Coast Highway to distinguish it from other similarly named roads in the nation. By 1932 there were roughly 400 miles of highway completed from the Columbia River south to the California border.[1]

In 1932 the highway was yet to be entirely connected. Five channels in the southern half of the state, Coos Bay, Umpqua River, Siuslaw River, Alsea Bay and Yaquina Bay were crossed by ferry service. Soon after the highway was completed, travel across these channels increased, due to tourism, and it became apparent that the ferries were inadequate to carry the volume of traffic. The state highway commission referred to the ferries as a "barrier to the growth and development of the Oregon coast region."[2]

Even before the completion of the highway it was assumed that these major crossings would be bridged. The state contemplated building one bridge per year after the Rogue River bridge at Gold Beach was completed in 1932. In 1931, chambers of commerce, community clubs and other residents of the central and southerly coastal areas organized the Oregon Coast Highway Association, which became the regional chamber of commerce. This group encouraged the state highway commission to construct another bridge. Because the country was in the midst of the Great Depression there was little funding for such a project.

In June, 1932 the Oregon Coast Highway Association organized a meeting at Waldport to discuss plans for constructing the final bridges. Ex-Governor Norblad proposed building three bridges as a means to create a market for lumber production in the area. Sam Dolan, an instructor in engineering at Oregon State College, suggested charging tolls on the bridges as a means to help them pay for themselves. This idea was not greeted warmly, but it was decided that with popular support tolls might be necessary. The Highway Association decided to encourage the state to appeal to the Reconstruction Finance Corporation for funds. The RFC was a Hoover Administration relief program established by Congress in 1932 to assist banks, railroads and other major businesses.

The stock marked had crashed on October 24, 1929, affecting the lives of millions of Americans. President Hoover believed that government should not provide relief for the jobless. Franklin Delano Roosevelt, governor of New York, was opposed to Hoover's beliefs. Roosevelt stated: "The country needs, and unless I mistake its temper, the country demands bold, persistent experimentation." On March 4, 1933 Roosevelt took office as president. Before approval of RFC funding for the coast bridges, administration changes cancelled the Reconstruction Financing Corporation. An application was then submitted to President Roosevelt's Public Works Administration program, for assistance to build the Oregon coast bridges. Roosevelt developed the National Recovery Act. The bill's main objective was to provide jobs for workers and establish a national pattern of maximum hours and minimum wages.

State Bridge Engineer Conde B. McCullough explained the state bridge section's role at the time: "When the opportunity of securing federal financing for the structures arose, no planning on any of the bridges except for the Alsea bay bridge at Waldport had been done. The force of designers was more than doubled, and a night shift organized. After six months of intensive work, plans and specifications were completed."[3]

The total estimated cost of the bridge project was $5,602,000. The original agrreement with the PWA stipulated that the federal government would grant the state $1,402,000 and loan the state $4,602,000 through the sale of bonds. The state decided to sell the bonds on the openmarket, saving on interest rates, and the federal government agreed. Within the state th question of tolls had not been resolved. It was estimated that a carload of five people would pay $4.00 to drive from Coos Bay to Newport and back. Increased highway revenues gave the state new confidence to pay back the loans, and the 1935 legislature abolished the issue of tolls on the coastal bridges.[4]

Many coastal residents believed that the bridges should be constructed of wood to assist the regions timber industries. The state highway commission considered constructing the bridges of wood, but found it impractical for the region. The high winds and damp salt air of this maritime environment would cause maintenance costs to run too high, and a few of the spans would be too long for a successful wooden bridge. At a highway commission meeting in Portland lumber interests agitated for the use of wood on the coastal bridges. McCullough believed that their pressure could delay the federal funds. Local residents feared the loss of federal funds, along with the benefits of jobs, so local chambers of commerce voted to support the state in its plan for steel and concrete bridges.

The amount of wood required for the falsework for the construction of steel and concrete bridges was nearly as much as if the bridges themselves were made of wood. The federal government granted final approval of the plans, and in the summer if 1934 contracts were awarded for the construction of five steel and concrete coastal bridges.[5]

One purpose of the coastal bridges project was to provide jobs for people unemployed by the Great Depression. The project accumulated over 2.1 million man hours. Additionally, the project benefited Oregon industries by consuming 16 million board feet of lumber, 54,000 cubic yards of sand, 110,000 cubic yards of gravel, and 182,000 barrels of cement. It was expected that future revenue from tourism along the highway would increase greatly, to the benefit of both state and region. After construction of the bridges tourism jumped 72 percent in one year.[6]

The completion of these five Oregon coast bridges was a significant milestone in Oregon transportation history. these structures culminated twenty two years of Oregon Coast Highway construction. concrete was the primary material and was used for its climatic durability and for its fluidity. The gothic arch was a primary architectural feature. These bridges represent classic examples of the Art Deco style which was a popular design style of the late 1920s and 1930s.

The distinguishing features of the style are simple, clean shapes, often with a "stream-lined" look: ornament that is geometric or stylized from representational forms, like nude female figures, animals, foliage and sunrays. State Bridge Engineer McCullough referred to the five PWA bridges as "jewel-like clasps in perfect settings linking units of a beautiful highway."[7]

The graceful symmetry of the bridges harmonize with the landscapes of the estuarine environment that they were designed for. Ornamental pylons and spires, gothic piers, spandrel brackets, arched railings, and landscaped waysides were utilized to make the bridges aesthetically pleasing. Despite the depression, architecture of the day tended towards streamlined decoration and finely crafted ornamentation. Such work was an artistic expression of optimism in a period of austerity. Amidst great fanfare, official dedications were held. There were christening ceremonies and bands, Coast Guard demonstrations and boat races--and even baby parades were scheduled to celebrate this important transportation milestone for the state of Oregon.[8]

DESIGN AND DESCRIPTION

The Yaquina Bay Bridge replaced a free ferry service across the bay. The central portion of the Oregon Coast Highway was completed in the mid 1930's with the construction of this bridge.

On May 3, 1933, B.A. Martin, Resident Engineer of the State Highway Department, arrived in Newport accompanied by an engineering crew consisting of Bishop Moorhead, draftsman; Norman A. Mann, transitman; Willard Burdette, L.V. Reed and R.A. Keasey, chairmen. They proceeded to make surveys for the proposed bridge, and set up offices in City Hall expecting to stay for two months.[9] All plans and specifications for the bridge were completed in 1933.

After federal funding was approved the construction contract was awarded to the Gilpin Construction Company and the General Construction Company as a joint venture. The total estimated cost of the structure including right of way, location surveys, field engineering and contract items was $1,380,457.25. this bridge was Project 982 with the Federal Emergency Administration of Public Works.

The graceful Yaquina Bay Bridge is a combination of steel and reinforced concrete arches with a total length of 3,260'. The width is 37' with a roadway width of 27' (two travel lanes). There are two 3'-6" sidewalks. The three main spans are steel arches. The central span over the navigation channel is steel semi-through arch 600' in length supported by concrete piers that extend downward to a depth of approximately 50 feet below the water. This arch was erected using cable tie-backs and no falsework. Spaced 30 feet apart, the arch trusses rise 226'-1" from center of end pins to crown.

The chords of the arch are of the box type, measuring 18¾"x 26", and are silicon steel. The roadway passes between two arch rings and is suspended from the arch rings by hangers. This main arch is 246 feet above sea level and provides a navigable channel 400' wide and 133' in height. The vertical clearance above the roadway is 14'-5". On each side of the central thru-arch are two 350-foot steel deck arches. The total length of the three steel arches is 1,300'. To the north of these main spans is 233 linear feet of concrete viaduct leading to a terminating plaza 51 feet in length. There is a 4 percent grade from the high bluff to the center of the 600-foot span. From this plaza stairways lead down to the state-owned and operated park. Park sites were acquired at both ends of the bridge and were improved with Civilian Conservation Corps labor.

The bridge has five reinforced-concrete rib deck arch secondary spans on the south end of the steel arches. These open spandrel concrete arches are 265', 232', 204', 180', and 160' in length respectively, for a total of 1,041'. All of the concrete arches are spported by piers resting on timber pilings driven to a depth of approximately 70 feet below the water line. all concrete arches are designed as continuous arches but constructed as three-hinge arches by interposing Considere hinges at the crown and skewbacks. the bents are tiered and ornamented with vertical detailing that is streamlined and modern in appearance. There are fifteen reinforced concrete deck girder approach spans, five on the north end and ten on the south end, for a total of 882'. These approach spans vary in length from 51' to 70'. "Pier and column surfaces were broken by scoring strips and web walls between main pier columns were cut away in the form of gothic arches.[10] Expansion joints in the concrete deck are cast chromium steel rollers riding on chromium steel plates set in the floor beams and stringers.

Approximately 220 men were employed each week, with an average payroll of $5000 a week. The contractors excavated 25,000 yards of dirt, placed 30,000 cubic yards of concrete in five arches, the viaduct and the roadway, drove 123,000 linear feet of piling and utilized 1123 tons of reinforcing steel and 2065 tons of structural steel. The concrete mixing plant was mounted on a large barge. Channel piers were poured direct from the mixing plant moored alongside.[11]

Decorative elements of the structure include ornamental brackets mounted at the top of the spandrel columns supporting and protruding beyond the sidewalks. The precast pilasters form small gothic arches, which which repeat the gothic form in the piers and bents. There is raised detailing on the pilasters that enhances the play of light and shadow along the railing panels. The pilasters are topped with cast-in-place railing.

In 1981 the concrete railings along the central portion of the span were replaced with a galvanized metal railing that replicates the arch form, but not the shadow lines of the old railing. The pedestrian plaza at the north end, at Yaquina Bay State Park, has elaborate curved stairways on each side of the deck. The vertical concrete walls are cast in a zig-zag motif with the dentil band under the deck taking the same shape, only more space is found between dentils. Concrete quoins are found in the solid walls of the approach spans. These details are repeated at the park and plaza at the south end of the bridge. Curved concrete seats are mounted along the parapet wall at both entrances to the bridge. Bronze seal sculptures were to be cast and placed at the entrance plazas of this bridge, probably above the rectangular pedestals that are at the ends of the parapet walls, but were never added.

Twin tall pylons or towers are located on top of the main bents on either side of the central through arch span. Arched openings allow pedestrians to walk through the base of the towers. These towers rise wedding cake style and terminate in an obelish point. The surfaces are embellished with vertical scoring and horizontal banding. Smaller tiered pyons are found above the bents that support the steel deck arches on either side of the main span. They are ornamented with vertical scoring and curved and raised relief work. They are considerably narrower than they are wide. The false work was integral to the beauty of this bridge and a 1986 Register Guard article explains the importance of the carpenters formwork on this bridge:

> All of the concrete work, from the bay floor, 30 feet below the water to the top of the ornamental spires, was formed in wood. The sculptured and fluted art-deco concrete detailing that has made the Yaquina span a favorite with bridge fanciers was actually the product of carpenter craftsmanship. the carpenter had to build it all in reverse so the concrete could be cast into it. the bridge is all carpentry. They just filled it with concrete, then took away the wood.[12]

The setting for the bridge is spectacular. Moving south on the structure one may look out to sea, where the jetties guarding the entrance to Yaquina bay extend far out to the ocean. Further south, beyond the bridge, one sees the Oregon Coast Highway extending through wooded sand dunes. To the north and west, lies the sea coast resort town of Newport. An article in the Coos Bay Times aptly describes the settling and structure as: "An engineering feat fully as difficult as the bridging of Coos Bay, was undertaken in the construction of the magnificent bridge at Newport where from a sheer cliff, 100 feet above the water line, a graceful structure crosses a 3,200-foot expanse to join, for the first time, the north and south shores of this port."[13]

Bridge engineer McCullough proudly explained: "No architects were retained in connection with the design of the above (coastal) bridges. In other words, both the architectural and engineering design work was done in our bridge designing and drafting rooms."[14]

ENDNOTES

1. Howard M. Coming, ed., Dictionary of Oregon History (Portland: Binfords & Mort Publishing Co., 1989), p.183.

2. Oregon State Highway Commission, Twelfth Biennial Report, 1934-36, p.15.

3. "History of Coast Bridge Program is Interesting," Coos Bay Harbor (Marshfield and North Bend, Oregon) 28 May 1936, p.1.

4. Oregon State Highway Commission, Twelfth Biennial Report, p.17.

5. "Lumbermen to Meet to Protest Concrete for 5 Coast Bridges," Sentinel (Cottage Grove, Oregon) 7 July 1933; "North Bend Backs Bridge Engineers," Harbor (North Bend, Oregon) 6 July 1933; "Squabble Over Lumber Ties Up Five Bridges," Journal (Portland, Oregon) 9 July 1933.

6. Arlene Castle, and others, Yaquina Bay, 1778-1978 (Newport, Oregon: Lincoln County Historical Society, 1979), pp.54-56.

7. "Lovely Settings to be Provided for New Bridges," Coos Bay Times, 1 June 1936, p.7.

8. Bill Calder, "Golden Anniversary," Oregon Coast, April/May 1986, pp.45-49.

9. "Work started on Yaquina Bridge Survey," Newport Journal, 3 May 1933.

10. M.E. Reed, "Building the Yaquina Bay Bridge on the Oregon Coast Highway," Western Construction News, May 1936, p.134.

11. "Yaquina Bay Bridge is Last Link in Roosevelt Highway," News-Times, 4 August 1982, p.6.

12. Mike Thoele, "Yaquina Bridge Spans Bay 50 Years," Register-Guard, 27 September 1986, p.1.

13. "Yaquina Span Affords Breath-Taking View," Coos Bay Times (Marshfield and North Bend, Oregon), 1 June 1936.

14. C.B. McCullough, Letter to White & Wycoff Mfg. Co. (Holyoke, Massachusetts), 30 April 1946, ODOT Bridge Section files.